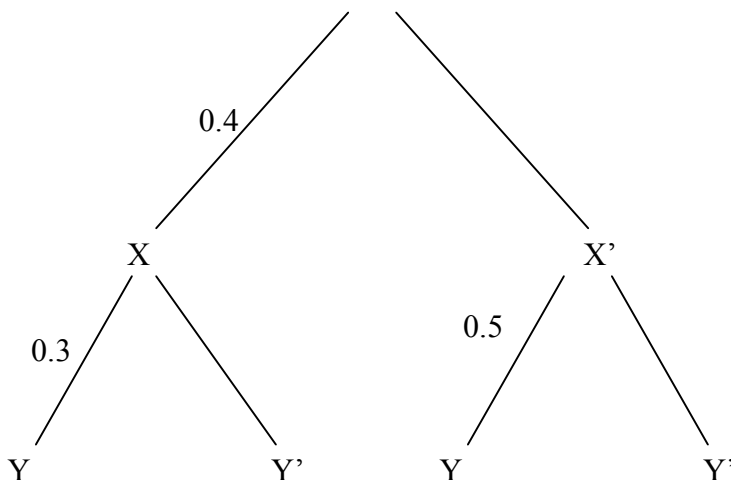


Conditional Probability Worksheet

Intuitive

- You draw a card at random from a standard deck of 52 cards.
 - Find the probability that it is a heart, given that it is red
 - Find the probability that it is red, given that it is a heart
 - Find the probability that it is an ace, given that it is red
 - Find the probability that it is a king, given that it is a face card
- Use the tree diagram to find each probability.

- $P(X')$
- $P(Y' | X)$
- $P(Y' | X')$
- $P(X \text{ and } Y)$
- $P(X' \text{ and } Y)$
- $P(Y)$
- $P(X | Y)$
- $P(X' | Y)$



Remember your Rules for Conditional Probability

$$P(A \text{ and } B) = P(A) \cdot P(B | A)$$

OR

$$P(B | A) = \frac{P(A \text{ and } B)}{P(A)}$$

If two cards are drawn without replacement from an ordinary deck, find the probabilities of the following results.

- A jack and a 10 are drawn
- The second is a heart, given that the first is a heart
- Two black cards are drawn
- The second is face card, given that the first is a jack

7. Dan's Diner employs three dishwashers. Al washes 40% of the dishes and breaks only 1% of those he handles. Betty and Chuck each wash 30% of the dishes; Betty only breaks 1% of hers, but Chuck breaks 3% of his. If a dish breaks, what is the probability that Chuck broke it?

8. Jar A contains 2 red balls and 3 white balls. Jar B contains 4 red balls and 1 white ball. A coin is tossed. If it shows “heads”, a ball is randomly picked from Jar A; if it shows “tails”, a ball is randomly picked from Jar B.

- a. Find the probability of picking a red ball
- b. If a red ball is picked, find the probability that it came from Jar A

9. Choose an employed person at random. Let A be the event that the person chosen is a woman and B the event that the person holds a managerial or professional job. Government data tells us that $P(A) = .46$ and $P(B|A) = .32$. Find the probability that a randomly chosen employed person is a woman holding a managerial or professional degree.

10. An insurance company has the following information about drivers between 16 and 18 years old. 20% are involved in accidents each year. 10% of all drivers in this age range are A students. Among those involved in an accident, 5% are A students.

- a. What is the probability that a randomly chosen student is an A student and is involved in an accident?
- b. What is the probability that a student gets in an accident, given that they are not an A student?

11. Microcomputers are shipped to the University bookstore from three factories A, B and C. You know that factory A produces 20% defective microcomputers, whereas B produces 10% defectives and C only 5% defectives. The manager in the store receives a new shipment of microcomputers and discovers that 40% are from factory C, 40% are from factory B, and 20% are from factory A.

- a. What is the probability of finding a defective microcomputer in this shipment?
- b. Suppose the manager randomly selects one microcomputer, and discovers that it is defective. What is the probability that it came from factory A?